

component in amount of 1200 to 3000 ppm, based on the weight of the catalyst; and (2) a sulfur component in amount of 40-150% of the equivalent weight necessary to form the alkali metal sulfate.

Cancel claim 3.

### REMARKS

The Examiner is respectfully requested to reconsider the objections to the instant disclosure. With respect to Example 6, the inadvertent error which occurred in the parent case has been corrected; the S/2Cs ratio is now correctly specified as 0.58 which is within the range claimed in accordance with the invention.

With respect to the S/2Cs ratio, this expression is designed to represent the amounts of S and Cs present in the catalyst relative to the amounts necessary to form the alkali metal sulfate and is readily calculated as indeed the Examiner has done in the Instant Official Action.

The claims have now been amended to specify that the alkali metal component is present in the amount of 1200 to 3000 ppm. Basis for this limitation can be found in original claim 3. The purpose of this amendment is to more clearly specify the dimensions of the present invention and to more clearly distinguish the catalyst of the present invention from those disclosed in the prior art.

Claims 1-4, 6-7 were rejected under 35 USC 102(b) as being anticipated by the Soo reference. The claims in the instant case have now been amended in order to specify the amount of alkali metal as 1200-3000 ppm, thus distinguishing

from the catalysts of Table III of the Soo reference which have markedly lower alkali metal content. An important feature of the present invention resides in the use of the claimed high levels of alkali metal which normally would result in an inactive catalyst but which, in combination with the designated sulfur levels, results in a superior catalyst. See page 4, lines 23-26 of the instant specification. The Soo reference is essentially concerned with catalyst containing an element such as Mo as an essential component, which components are not encompassed by the instant claims. The reference does not describe an ethylene oxide catalyst having the composition which is set forth in the instant claims, and thus does not provide an anticipation of the claims as now amended. It is noted that the ethylene oxide catalyst art is both a complex and crowded prior art. There are a myriad of various teachings, some of which are contradictory concerning various catalyst compositions. Within the context of the myriad of teachings applicant has set forth a catalyst composition which is not described in the prior art and which provides outstanding results when used for the oxidation of ethylene as set forth in the experimental data contained in the subject case.

In view of the above, it is respectfully requested that the rejection of claims 1-4 and 6-7 on the Soo reference be withdrawn.

Claims 1-7 were rejected under 35 USC 102(b) as being anticipated by Rizkalla et al. USP 5,854,167. Reconsideration and withdrawal of this rejection as it may apply to the claims now in the case is respectfully requested.

The essence of the present invention is in the provision of a catalyst which is both rhenium and transition metal free. Still further, the catalyst comprises silver on a support containing a specific promoter combination which consists essentially of the alkali metal component and a sulfur component in designated amounts as well as optionally a fluorine component. The catalyst does not contain other promoters which might provide a significant effect on the catalyst use and performance.

By way of contrast, Rizkalla '167 requires in the catalyst formulation described therein a germanium or tin component as a critical component of the composition. Quite clearly, compositions which require germanium or tin as an effective component are different and distinct from the catalysts claimed in the instant invention which exclude the presence of such components. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejection under 35 USC 102(b) on Rizkalla USP 5,854,167.

Additionally, claims 1-7 were rejected under 35 USC 102(e) as being anticipated by Rizkalla et al. USP 5,905,053 or Rizkalla et al. USP 5,958,824. Reconsideration of this rejection in light of the following discussion is requested.

Considering Rizkalla USP 5,905,053, it is respectfully pointed out that this patent requires a component selected from phosphorus, bismuth and antimony as a critical component of the catalyst formulation. As described above, the claims contained herein specifically by their terms exclude catalyst compositions which contain such components as an effective ingredient. Accordingly, it can

readily be seen that Rizkalla 5,905,053 fails to provide an anticipation of the instant claimed catalyst composition.

Likewise, Rizkalla 5,958,824 describes an ethylene oxide catalyst which contains as a critical component a lanthanide material. It should be noted as above described that the claims of the instant case by their terms specifically exclude the presence of an lanthanide component in amount effective to provide a significant effect on the catalyst performance.

In view of this essential distinction, reconsideration and withdrawal of the rejection of claims as now presented under 35 USC 102(e) on Rizkalla 5,958,824 is respectfully requested.

Claims 1-7 were rejected additionally under 35 USC 103(a) as being unpatentable over Rizkalla et al USP 5,854,167. Reconsideration and withdrawal of this rejection in light of the following discussion is requested.

As pointed out above in connection with the Rizkalla 5,854,167 reference, this reference requires as a promoter component germanium or tin. By way of contrast, the present claimed catalyst by the claimed term excludes the presence of germanium or tin components in an amount effective to provide a significant catalyst effect. There has been extensive work by many researchers in the field of ethylene oxide catalysis. There have been an extremely large number of catalyst formulations proposed with sometimes conflicting claims of effectiveness. Against this background of extensive prior work, the present inventor has devised a catalyst which is relatively simple in composition and which is highly effective for the oxidation of ethylene to ethylene oxide. Reduced

to its essentials, the catalyst of the present invention comprises a support such as alumina having deposited thereon silver as an essential component together with a promoter combination which comprises the designated amount of alkali metal together with sulfur and optionally fluorine. By the term "consisting essentially" the compositions claimed herein are limited to the specified components and do not encompass compositions which contain other materials which lend a significant effect to the catalyst performance. The present invention actually comprises the use of amounts of alkali metal such as cesium which are higher than those generally deemed effective in the prior art. The surprising discovery has been made that at such high alkali metal concentrations, which normally would result in a deactivation of the catalyst, the provision of the designated amounts of sulfur results in a catalyst having surprisingly and superior characteristics for the production of ethylene oxide. This is apparent from a consideration of the data contained in the experiments presented in the instant specification.

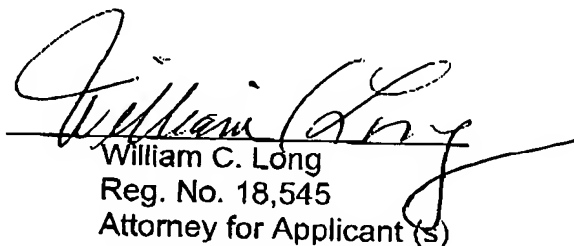
Accordingly, it is respectfully submitted that the present discovery is indeed surprising when considering the teachings of the prior art and indeed is novel since the specific formulations are not described in the references of record.

Accordingly, reconsideration and withdrawal of the rejection of the claims on 35 USC 103(a) is respectfully requested.

The number of claims in the present case have been reduced and no new independent claims have been added. Accordingly, it is believed that no additional fees are owed at this time. Should this be incorrect, authority is being given to charge and deficient amount to Deposit Account No. 12-2138.

Allowance of all of the claims is requested.

Respectfully submitted,

  
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Patent Case SD-200B

**VERSION WITH MARKINGS TO SHOW THE CHANGES MADE**

Claim 1. A rhenium and transition metal free catalyst for the oxidation of ethylene to ethylene oxide comprised of silver on a solid support and containing a promoter combination consisting essentially of (1) an alkali metal component in amount of [at least 1000] 1200 to 3000 ppm, based on the weight of the catalyst; and (2) a sulfur component in amount of 40-150% of the equivalent weight necessary to form the alkali metal sulfate.

Claim 2. The catalyst of claim 1 wherein the alkali metal component is cesium.

[Claim 3. The catalyst of claim 2 wherein the cesium component is in amount of 1200 to 300 ppm.]

Claim 4. The catalyst of claim 1 wherein the support is alpha alumina.

Claim 5. The catalyst of claim 1 comprised by weight of 5-20% silver.

Claim 6. The catalyst of claim 1 additionally containing 10-300 ppm of a fluorine component.

Claim 7. The method for producing ethylene oxide which comprises reacting ethylene and molecular oxygen in the presence of the catalyst of claim 1.